IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
(Case No. 05-409)

In the Application of:	)	
	)	
Jeffrey Powell	)	Examiner: Hung V. Ngo
	)	
Serial No. 10/535,684	)	
	)	Group Art Unit: 2831
Filed: May 19, 2005	)	
	)	Conf. No.
Title:		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RULE 1.312 DECLARATION

I, David Charles Bannister residing at 1, Conference Grove, Crowle, Worcester WR7 4SF, United Kingdom, declare as follows:

1. I am an employee of the assignee of the above-captioned patent application.

2. My CV setting forth my education, publications, and work experience is attached as Exhibit A.

3. I am currently employed as a Business Development Manager, in the area of microwave and millimeter-wave technology. My background is in the design of microwave and millimeter-wave circuits and modules. I have worked in the area of microwave and millimeter-wave technology for 20 years, and have presented at several technical and business-focused conferences world-wide.

4. I have reviewed the above-identified patent application, the pending claims, the outstanding Office Action and the following prior art references:

   US5608188 - "Choon"

   US6901660 – "Miska"

US5416668 – “Benzoni”

US5098735 – “Henry”

5. **Discussion of prior art cited by Examiner**

Discussion of Choon: Choon discloses a compartmentalized shielding system, the purpose of which is to provide a degree of electrical isolation between adjacent electrical circuits, such as a transmitter-receiver pair. The disclosure shows a single shielding box having a partition that separates the box into two distinct, physical compartments, and which is designed to prevent or significantly reduce the electromagnetic (EM) radiation passing from one compartment to another.

I understand the mechanism by which the EM radiation is prevented from passing from one compartment to another to be the introduction of a shielding barrier between the two. The partition specifically has electromagnetic shielding properties, and is preferably made from a metallic material – pre-tinned Brass – although no other material is mentioned. The action of such a shielding barrier, made from a highly conductive material such as that preferred, is to provide a plane at which the tangential component of the electric field, E, and the normal component of the magnetic field, H, associated with any EM field within a compartment, collapse to zero, thereby preventing propagation of the EM field beyond the barrier. It thereby ensures that each compartment within the overall package is isolated in electromagnetic terms, from every other compartment.

I therefore understand the purpose of the structures disclosed by Choon et al in US5608188 to be to provide a package within which different circuit assemblies are isolated from each other by the formation of compartments within the package. The patent does not in any way address the issue of resonant modes within cavities (such as compartments). Nor does it anticipate the use of any partially absorbent element to attenuate or eliminate such modes. Nor, therefore, does it anticipate the adaptation of the conductivity of the compartment wall – or indeed of any other surface – to facilitate the absorption of EM radiation.

Discussion of Miska: Miska discloses a gasket designed to seal a metallic housing or similar, to prevent the entry or exit of EM radiation to or from the housing, to provide electromagnetic isolation of components inside the housing and to provide a continuous conductive path around the inner surface of the housing. The gasket of Miska is designed to be hardwearing and so suitable for use where movement may occur, such as on door edges. Small gaps between or within the walls of an enclosure, or between the walls and a door of an enclosure can allow the escape of EM radiation. The gasket of Miska is designed to fill these gaps. All embodiments disclosed in Miska comprise a conductive layer, with preferred embodiments also having additional layers to provide the ability to withstand abrasion. All embodiments feature a highly conductive metallic layer for conducting currents between the surfaces in contact with the gasket.

In common with Choon et al, Miska does not disclose, anticipate or in any way discuss the attenuation or elimination of electromagnetic modes within any enclosure.

Discussion of Benzoni: Benzoni discloses a housing suitable for incorporating circuitry on a substrate that, in the embodiments disclosing a partition member, uses the partition member to divide the housing into separate physical compartments, with circuitry on one part of the substrate being in a different compartment to circuitry on another part of the substrate. The partition member has a conductive coating applied thereto, and the purpose of the partition member is to prevent EM radiation from circuitry on one side of the partition from passing through to the other side of the partition and interfering with circuitry there. Therefore it is similar in principle to the Choon disclosure, with a difference being that it provides for the containment of a single circuit board across more than one physical compartment. In this case, the circuit board has on it a conductive trace, to maintain a continuous conductive path between all metalised surfaces of the housing.

All inner surfaces of the housing and lid are uniformly plated (with no gaps of greater than one half of the shortest wavelength of any frequency of interest) with an electrically conductive material, such as copper. In common with Choon et al, there is no indication whatsoever of Benzoni anticipating the adaptation of the conductivity of any surface within the package, for the purpose of absorbing electromagnetic energy associated with any cavity mode.

Discussion of Henry: Henry discloses a house or other dwelling having a shielding layer applied to the walls in the form of a paint designed to absorb EM radiation at the free-space characteristic impedance of 377 Ohms. The invention is designed to prevent occupants of the dwelling being exposed to the EM radiation. The disclosure is therefore of a shielding nature as in the Choon and Benzoni citations discussed above, but with the difference that it is not designed to shield or protect electronic circuitry, and that the physical scale is very different.

Again, and in common with Choon et al Miska and Benzoni, there is nothing disclosed by Henry that anticipates the attenuation or elimination of electromagnetic modes within an enclosure.

6. **<u>Claims of the present application</u>**

Claim 1 of the present application (10/535684) has the following limitations amongst others:

a) a material extending into the cavity, the material having a conductive region; and

b) the conductivity thereof being adapted to be at least partially absorbent to electromagnetic radiation.

I do not see Choon or Benzoni as having limitation a), because the partition mentioned in those documents is used in effect to create two independent cavities. Once a partition, as described in both Choon et al and Benzoni has been introduced into a package, its function is that of a conducting wall.

I do not see Choon or Benzoni as disclosing limitation b), as the walls (including the partition element) of both are coated in a conductive material, but no suggestion is made in them that the conductivity is adapted to be partially absorbent to EM radiation. Such adaptation would involve a deliberate reduction in the conductivity of the material, so as to introduce resistive losses. In the case of a wall or partition, such as those disclosed by Choon et al and Benzoni, this would run counter to the very purpose of the structure. A wall or partition is introduced to act as an electromagnetic shield. Any reduction in the conductivity of such a shield would, as well as introducing resistive loss as described above, also result in signal leakage from the enclosure. I believe therefore that a person of ordinary skill in the art would see, on reading either Choon or Benzoni, that the conductive layers applied to the partitions would be configured to be as conductive as possible given other constraints such as metal thickness, metal type etc. There would therefore be no adaptation of the conductivity so as to be at least partially absorbent to EM radiation, as required by limitation b).

The only cited prior art which describes the use of a surface with a preferred impedance other than zero is Henry, which describes a surface with an impedance of 377 Ω/Square. This surface impedance is used to provide a match to the characteristic impedance of unbound free-space (377 Ω). It would be obvious to someone of ordinary skill in the art that applying a resistive surface to the edges (walls) of a cavity – as would result from the application of the teaching of Henry to the patented structures of Choon et al and Benzoni – would result in minimal absorption of resonant cavity modes, as the tangential E-field associated with such a mode is minimal at the walls of such a cavity. Any absorber aimed at damping a resonant mode within a cavity would need, in order to have maximum effect, to be introduced at or near the centre of the cavity – as in the present application.

Features a) and b) do not appear in Miska. Although materials such as nichrome and carbon are mentioned as layers of the gasket, they are laid on top of highly conductive metallic layers such as silver or copper. These metallic layers act

electrically as a short circuit, and appear in parallel with any greater resistance of the nichrome or carbon. Therefore any currents induced in the gasket of Miska would flow almost entirely in the metallic layers and so would not be absorbed in the nichrome or carbon material. Furthermore, Miska does not disclose any adaptation of the nichrome or carbon layers to be at least partially absorbent to EM radiation. It would not be in the interests of anyone using the teaching of Miska, Choon or Benzoni to adapt the conductivity of its coatings to be anything other than as conductive as possible, as their purpose is to permit the free flow of induced currents to ground, thereby containing the EM radiation generated on one side of a boundary, to that side.

Claim 23 states as follows: " A package as claimed in claim 1 wherein the region having thereupon the conductive material resides in a slot located in a dielectric material in the cavity." I do not believe that such a structure, i.e. that of a dielectric containing a slot that itself contains conductive material having a conductivity modified according to claim 1 is disclosed in any of the above cited prior art documents. The partitions of Choon and Benzoni, as well as being highly conductive, do not reside within a slot in dielectric material.

7. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Sec. 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

[signature]
[DECLARANT]

Date: 9th July 2009

Curriculum Vitae for Dave Bannister

Dave Bannister joined The Royal Signals & Radar Establishment, RSRE, Malvern, following completion of his MSc in Microwave Solid State Physics in 1989. Since then, his career has been focussed on the development of Microwave and Millimetre-Wave technology based solutions for both military and commercial customers. Since 2001, Dave has played leading roles in identifying commercial markets for QinetiQ's Microwave and Millimetre-wave technology and design skills. He has acted as QinetiQ's main representative within the International Wireless Industry Consortium, thereby raising the profile of the companies' technology and capabilities in wireless domains, including communications.

April 2008-present: Responsible for investigating commercial markets for QinetiQ's background IP. This work has involved the identification of adjacent market opportunities requiring the same skills and IP, the recognition of appropriate customers and partners, the sizing of the market, and the recognition of QinetiQ's USPs. This work uncovered significant opportunities for QinetiQ in the cellular (LTE and WiMAX) backhaul space.

April 2005 - April 2008: Proposition development manager and technical strategy manager: Responsible for developing commercial propositions centred on QinetiQ's capabilities in the areas of MMIC design, Millimetre-wave front-end development and Communications Systems development.

Business Stream Manager: Responsible for developing business opportunities based on QinetiQ's MMIC design and mm-wave module capabilities. Secured continued sale of these design capabilities into the Passive mm-wave imaging programmes within QinetiQ, as well as securing a technology license deals with external customers

MMIC Design Engineer: Working on a number of military and commercial contracts. Specialising in the design of mm-wave receiver front-end MMICS. Was appointed Business Stream Manager for the technology, in 2000.

External Publications:

1. 'A 44GHz low noise block downconvertor MMIC suitable for EHF-satellite communications applications' A.R.Barnes, D.C.Bannister, M.T.Moore. Radio Frequency Integrated Circuits Symposium, 1998. IEEE 07/07/199807/1998.
2. 'A 60GHz integrated sub-harmonic receiver MMIC' C.A.Zelley, A.R.Barnes, D.C.Bannister, R.W.Ashcroft. Gallium Arsenide Integrated Circuits (GaAs IC) Symposium, 2000.
3. 'A 2 – 18GHz wideband high dynamic-range receiver MMIC' D.C.Bannister, C.A.Zelley, A.R.Barnes. IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, 2002.
4. 'Enabling cost-effective ACC front-ends'. D.C.Bannister, International Wireless Industry Consortium (IWPC) colloquium, Stuttgart. October 2004.
5. 'Commercial applications for Millimetre-Wave MMICs'. Jeff Powell and Dave Bannister. IoP Publishing, Technology Tracking, January 2005.
6. 'MILTRANS – Millimetric Transceivers for Transport Applications' D.J.Gunton et al (inc D.C.Bannister). 2005

7. 'Advances in millimetre-wave technology'. Gabriel Vizzard & Dave Bannister. International Wireless Industry Consortium (IWPC) Colloquium, Dulles, Washington D.C, June 2007.
8. 'Spectrally efficient P2P radios for global data backhaul markets'. Dave Bannister. International Wireless Industry Consortium (IWPC) Colloquium, Milan. January 2008

Qualifications:

BSc (Hons) Physics, Portsmouth Polytechnic, 1987
MSc Microwave Solid-State Physics, Portsmouth Polytechnic, 1989